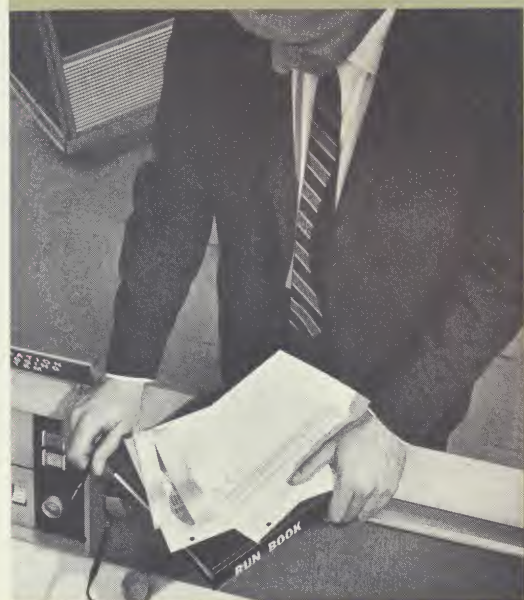
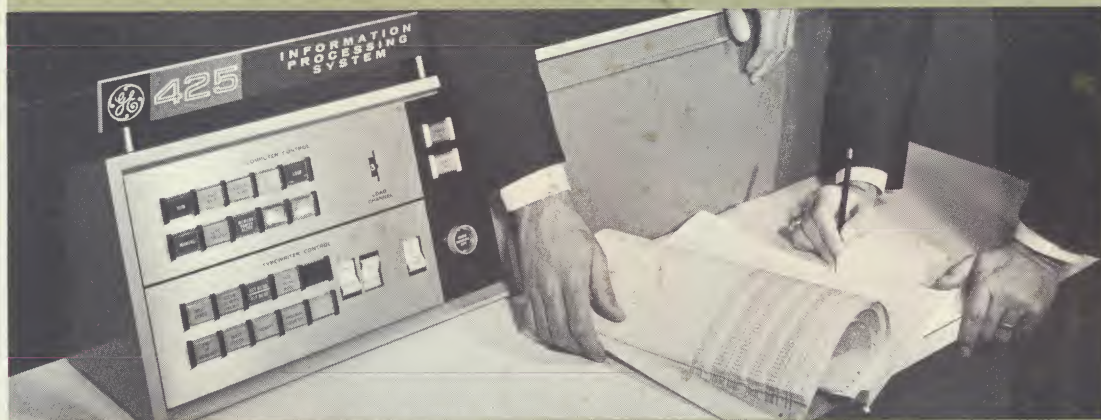


GENERAL ELECTRIC
COMPUTERS

COMPATIBLES / 400

a
growth
oriented
family

GENERAL  ELECTRIC



A family of computers . . . with unmatched problem-solving power

This family has problem-solving powers that no other data processor in this price class can even approach . . . powers made possible by combining hardware, software, and an operating system into a fully integrated package.

The Compatibles/400 have built-in growth potential with upward compatibility to protect your investment. And when you move up to a system with higher performance, you don't have to change programs, or peripherals, or retrain your personnel.

THE SYSTEMS

The Compatibles/400 have a strong family resemblance that makes for easy business data processing/data communication system growth. All use a 4-character word with 24 bits plus parity; use one- or two-address instructions; accept alphanumeric data; and do decimal arithmetic. Each of the central processors operates with the same peripherals. Special input/output channels provide access to a communication network or remote stations. The powerful user-oriented features work together to give the systems batch, random, and real-time capability.

THE CENTRAL PROCESSORS

They're new outside . . . the compact design is functional as well as good looking. For example, a factor in processor speeds is wire length. As speeds increase, current paths must be shortened. This design permits expansion without sacrificing speed to distance.

They're new inside . . . the Input/Output System integrates the Central Processors and the peripherals to do more work in less time. The Operating System increases system efficiency by decreasing the elapsed time between jobs. Hardware, software, and the Operating System are closely interrelated to apply their combined powers to your problems.

Data and File Manipulation



HARDWARE

One- or two-address instructions give your programs extra capability. Scatter-read places data in memory in nonconsecutive order. No unpacking time is needed, and data is ready for immediate processing. Scatter-read provides the flexibility of a character-oriented system with the speed and power of a word system. Gather-write takes data from memory according to a prescribed pattern. Any-word indexing saves housekeeping time. There are also six fixed index words.



SOFTWARE

The Macro-Assembly Program — is a language processor with compiler powers that accepts words, statements, and phrases to produce machine instructions. It provides segmentation and extensive program analysis.

GE-400 COBOL — the common business-oriented language familiar to many programmers is available for the Compatibles/400.

GE-400 FORTRAN — Programs written in FORTRAN language can be run when there are scientific/engineering computations to be done.

Integrated Data Store (I-D-S) — provides powerful information organization, storage, maintenance, and retrieval ability for random access files. It provides, at the compiler level, powerful commands which reduce programming and check-out time. I-D-S works in conjunction with COBOL to provide a comprehensive programming system.

The Input/Output System — eliminates much of the detailed coding for I/O operations. For example, for tape operations such as opening files, reading, writing, buffering, block counting, error detection, tape swapping, etc., the programmer only needs to call for data from the file.



OPERATING SYSTEM

The Program Monitor — decreases elapsed time from program concept to final checkout. It reduces elapsed time between jobs by maintaining the computer in continuous operation processing independent jobs.

Sorting and Merging



HARDWARE

Scatter/Gather by Record — a power of the Central Processors that enhances sorting and merging capabilities. It permits tighter packing of data on tape, and saves tape time. But the feature is not limited to tapes; it works with all subsystems.

Dual Channel Controller — increases the sorting and merging powers of the systems, by permitting simultaneous tape reading and/or writing. All tapes may be accessed from either channel.

Indirect Addressing — speeds sorting and merging operations. When this feature is combined with gather-write, you merely sort the addresses of data keys, not the entire data record.



SOFTWARE

Sort and Merge Generators — use the features of the systems to produce fast efficient object programs with minimum effort. The generators have options for insertion of your own coding for manipulation of records or files prior to and following the sort.



OPERATING SYSTEM

The Program Monitor — gives the computer itself a greater share in achieving more efficient operation by minimizing operator decisions and actions.

Report Production



HARDWARE

Powerful Edit Capabilities — let you edit up to 16 characters at a time doing zero suppress, floating dollar sign, asterisk protect, comma and decimal insertions, sign control, and others. Editing time in the Central Processors is reduced.



SOFTWARE

The Report Program Generator — makes report preparation easy by eliminating the tedious coding often associated with report writing. Instead of coding, you merely fill out the Report Description form. This generator uses the same input data description as the Macro-Assembly Program, so the file doesn't have to be described again. You can also insert your own coding to tailor the object program to your unique requirements.



OPERATING SYSTEM

The Program Monitor — increases the ratio of useful computer time to total available computer time. For example, it reduces the amount of tape changing by the operator by reading in requested programs from a system tape.

Multiprogramming



HARDWARE

Memory protection is provided by base address registers which dynamically provide each program and its I/O channels a privileged area within core memory. Production programs may be run simultaneously with debugging runs without danger. The interval timer assures that each program obtains its share of computer time.



SOFTWARE

Programs prepared by the programming languages or generators can be run in the multiprogramming environment without the programmer's having to be concerned. Programmers prepare the work as though it were to be run in a uniprogramming mode.



OPERATING SYSTEM

The multiprogramming operating system permits the asynchronous initiation, interruption, restart, and termination of two or more programs within the restraints of memory and peripheral devices. These programs may be production runs, sorts, scientific calculations, media conversions, compilations, or direct-access programs. The operating system stresses maximum throughput.

More Benefits

Computer users will recognize many features in the Compatibles/400 — but never have so many desirable features been combined in one system. A team of experienced users, programmers, and engineers produced a series of computers that makes it easy to apply full-system powers to your data processing/data communication/scientific problems.

SIMULTANEITY FOR HIGH THROUGHPUT

To keep work throughput high, simultaneity is a must. All subsystems are buffered. Twelve input/output channels permit twelve operations to proceed simultaneously with computation.

MODULARITY FOR GROWTH POTENTIAL

Modularity in the Compatibles/400 means it costs you less when you need to expand. A GE-415 System can be converted to a GE-425 over a weekend. The programs you ran on Friday afternoon will run on Monday morning. There is no need to change peripherals to step up to the next power level.

WIDE CHOICE OF MAGNETIC TAPES

A wide choice of magnetic tape subsystems is offered for use with the Compatibles/400 computers. Choose the tape density, transfer rate, and controller that you need for the application. All tape subsystems are compatible with the most widely used tape format — 7 or 9-channel. The dual-channel controller gives maximum usability from tapes by giving the computer simultaneous access to any two tape units.

DIRECT ACCESS CAPABILITIES

The Compatibles/400 can be expanded efficiently into a Direct Access system with the Direct Access option which includes the Interval Timer, Memory Protect, Non-Stop Mode, Symbol-Controlled Move, and High-Speed Channels. In addition to these features, new random access devices, communication controllers, and remote terminals are available.

FLOATING POINT

The Compatibles/400 perform fixed-and floating-point operations on 48-bit words. Execution times are very competitive with other systems. Floating Point is a direct extension of the central processor and does not require an input/output channel.

RELOCATABLE ACCUMULATOR SAVES PROCESSING TIME

The Relocatable Accumulator saves time — it does the load-add-store job three times faster than the conventional way. The Relocatable Accumulator — an industry first from General Electric — moves the accumulator to the data, instead of moving the data to the accumulator. It makes scatter/gather even more useful. For example, you can scatter-read data on input, move the accumulator to the data, process it, and then gather-write it from the same position where it was read in. No needless shuffling of data in and out of the accumulator, or from input area to working area to output area.

FAMILIAR INPUT FORMAT FOR EASIER COMMUNICATION

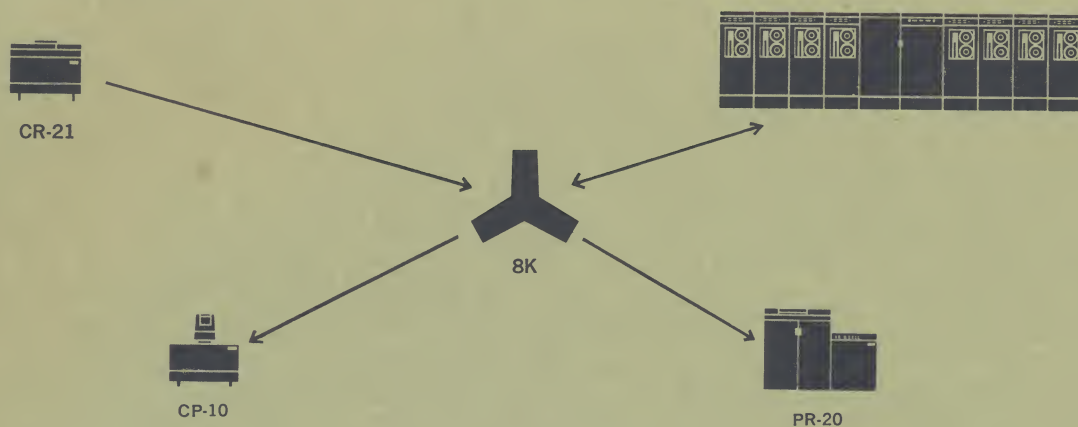
Most users prefer to communicate with a business data processor in the way that is most familiar — with alphanumeric input/output, and they prefer to use decimal arithmetic. Recognizing this user preference, the Compatibles/400 have alphanumeric input/output and do decimal arithmetic. There are advantages, however, in using the binary format for instructions and memory addressing. Therefore, the Compatibles/400 use the advantages of both alphanumeric and binary for more effective communication.

The console has a minimum of lights and switches, and is easy to learn and operate. The system and the operator exchange information through the console typewriter.

JOB-ORIENTED, PRE-PROGRAMMED PACKAGES

General Electric supplies many pre-programmed packages as effective tools for a variety of processing jobs. Some of the packages are: Resource Allocation, for best utilization of resources; ADAPT, for numerical control of machine tools; Linear Programming, for scientific management; Critical Path Method, for project management; and Transportation Pack for transportation problems.

Batch Processing

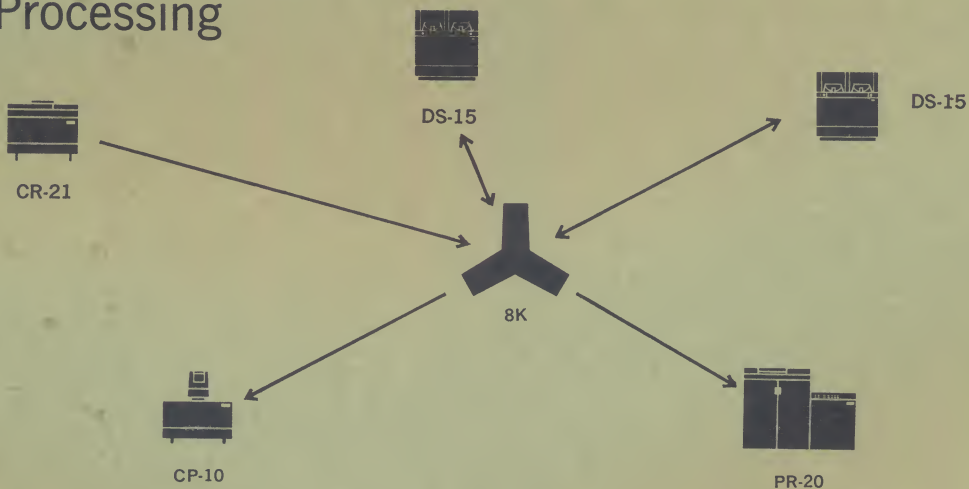


MT-23

Typical applications include payroll, personnel, invoicing, manufacturing planning, and general ledger work, using the uniprogramming operating system.

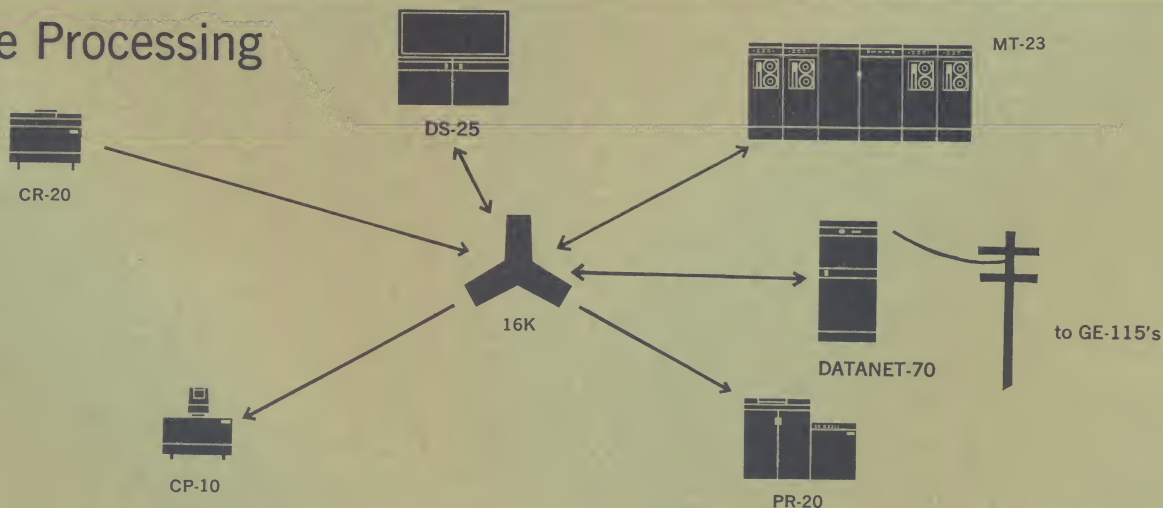
SCIENTIFIC/ENGINEERING PROCESSING — With only four magnetic tapes, this system with the Floating Point Option does high-speed fixed-and floating-point operations on 48-bit fields.

Random Processing



This mass storage oriented system is ideal for inventory control, parts explosion, shop scheduling, machine loading, and manufacturing simulation. It uses the uniprogramming operating system.

Real-Time Processing

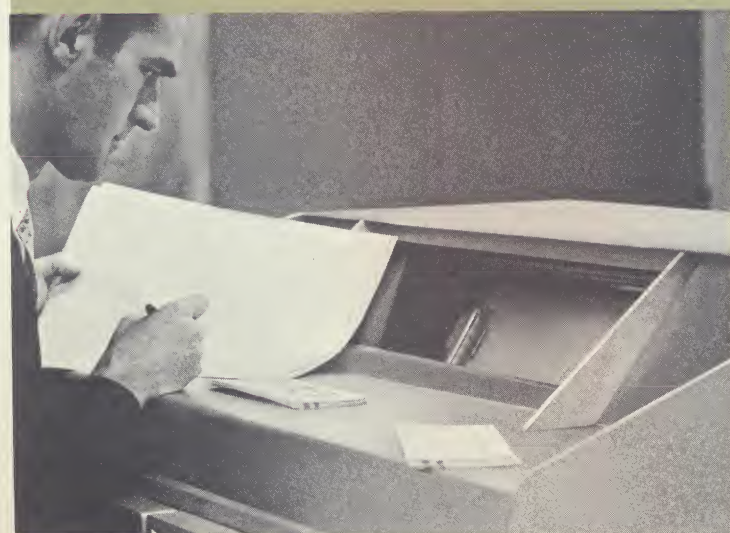
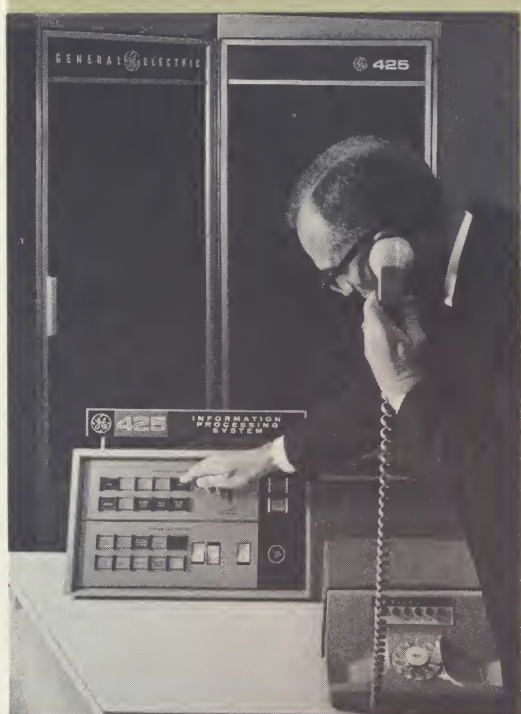
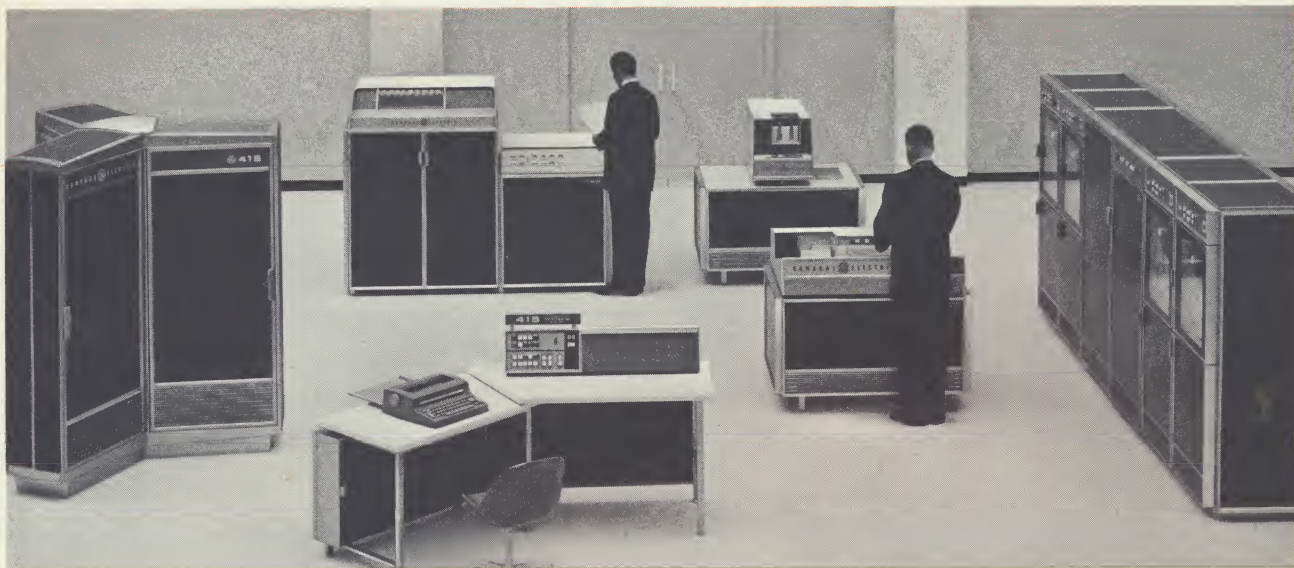


MT-23

to GE-115's

Where time is critical, an integration of data processing and data communications is beneficial. Typical applications include order processing, remote inquiry, passenger reservation service, and centralized

inventory control and purchasing for multiplant requirements. This uses the multiprogramming operating system.



Specifications

CENTRAL PROCESSORS

GE-415: Four 6-bit characters per word (24 bits plus parity). Up to 131,072 characters of core memory. Memory cycle time equivalent to 1.4 microseconds per character. Over 200 instructions, including one-address and two-address instructions. Alphanumeric input/output and data manipulation, decimal arithmetic, binary instruction format and addressing, with added binary capabilities.

The accumulator, which is located anywhere in memory may be 4, 8, 12, or 16 characters in length, changeable by program. Any word in memory may be an index word. Also six fixed index words for conventional indexing. Eight buffered input/output channels for peripherals. Special controller for data communication lines. Complete error checking circuits. Scatter-read and gather-write increases processor efficiency.

GE-425: Memory cycle time equivalent to 1.28 microseconds per character, increasing processor power and throughput over the GE-415. Word length, memory capacity and all other characteristics are the same as those for the GE-415.

GE-435: Memory cycle time equivalent to 0.68 microseconds per character, increasing processor power and throughput over the GE-425. Word length, memory capacity and all other characteristics are the same as those for the GE-415 and GE-425.

PERIPHERALS

CR-20, CR-21 Card Readers — read standard 80-column cards column-by-column at 900 cards per minute. Hollerith data cards or binary program decks are read separately, or they may be read inter-

mixed under hardware control. CR-21 reads 80 or 51-column cards; has two output stackers for selective pocketing after read.

CP-10, CP-20, Card Punches — punch standard 80-column cards. Read-after-punch check verifies data accuracy. CP-10 punches 100 cards per minute, CP-20 punches 300 cards per minute.

PR-20 Printer — 136 columns, 1200 lines per minute. 64 printable characters. 6 or 8 lines per inch. Vertical format control by print command, and/or tape loop. Horizontal format control by print command. Skips paper at 27 $\frac{1}{2}$ inches per second.

Magnetic Tape Subsystems

MODEL	7-CHANNEL TRANSFER RATE	9-CHANNEL TRANSFER RATE	DENSITY BPI	TAPE SPEED IPS
MT-17	21/7.5	28/10	556/200	37 $\frac{1}{2}$
MT-19	30/21/7.5	40/28/10	800/556/200	37 $\frac{1}{2}$
MT-21	42/15	56/20	556/200	75
MT-23	60/42/15	80/56/20	800/556/200	75
MT-24	83/30	111/40	556/200	150
MT-26	120/83/30	160/111/40	800/556/200	150

Single and dual channel controllers available. Up to 16 tape units per controller. High-speed rewind to beginning of tape rewinds full 2400 foot reel in 90 seconds (300 ips). Tapes are mounted easily and quickly.

DS-15 Removable Disc Storage Unit — stores almost 8 million characters on a single disc, transferring data at 259,000 characters per second. A single controller controls up to 8 disc drives to place approximately 64 million characters on line.

DS-20 Disc Storage Unit — available with 4, 8, 12, or 16 discs. Four or eight discs may have optional fixed-position heads for fast access. The 16-disc file stores 23.5 million 6-bit characters. Average positioning time is 199 milliseconds. Controller has 1024-character buffer. Four files may operate with one controller to give a capacity of 94 million characters.

DS-25 Disc Storage Unit — stores over 200 million 6-bit characters on 32 discs, accessed by 16 positioning arms. Four units per controller provide 800 million characters of storage. Sixteen access motions can occur simultaneously in one unit, for a total of 64 per subsystem. Data is transferred at 300,000 characters per second.



Specifications

MS-40 Mass Storage Subsystem — stores 532.8 million characters transferring data at 73,300 characters per second, accessing data at an average of 550 milliseconds. Eight units with one controller stores 4.26 billion characters.

TR-20 Perforated Tape Reader — reads 5, 6, 7, or 8 channel perforated tape at 500 characters per second. Plugboard provides format control.

TP-20 Perforated Tape Punch — punches 5, 6, 7, or 8 channel tape at 150 characters per second. TR-20 does off line parity checks of TP-20 tapes. TR-20 and TP-20 may be used to duplicate tapes off line.

MR-20 Magnetic Reader/Sorter — reads 1200 mixed-size MICR documents per minute on line or off line. Optional features include a transposition check digit verifier and endorser.

ML-20 Multiple Tape Lister — prints five item listings and a master list under program control at 2000 lines per minute. Each tape has 24 printable positions. Two Multiple Tape Listers on line prepare eleven separate listings, plus a master list.

Summary

When all points are considered and evaluated, the comparison that counts is cost versus performance. Compare the features that account for the high performance of the Compatibles/400 with any other system in the price range — General Electric welcomes such a comparison. You can justify any one of the Compatibles/400 on this basis alone. But there's more.

Much more. Program compatibility within the family means you can amortize your programming costs over a longer period. Programs you prepare for the GE-415 operate without change on the GE-425 or GE-435. If you've outgrown your 1401, the 1401 Compatibility Option lets you make a smooth, easy changeover to the Compatibles/400.

Call or write the nearest Computer Department office of the General Electric Company for full details on The Compatibles/400.





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